

**I. INTRODUCTION**

Claims 13-16 and 25-28 have been amended above to correct minor informalities thereof, and not for reasons relating to patentability. New claims 33-40 have been added. Claims 1-8 were previously cancelled, without prejudice. Applicants reserve the right to pursue the subject matter of cancelled claims in one or more continuing applications. Accordingly, claims 9-40 are now under consideration in the present application.

Provided above, please find a claim listing indicating the claim amendments, additions and current status of the claims on separate sheets so as to comply with the requirements set forth in 37 C.F.R. § 1.121. Applicants respectfully submit that no new matter has been added.

**II. REJECTIONS UNDER 35 U.S.C. § 101 SHOULD BE WITHDRAWN**

Claims 13-16 and 25-32 stand finally rejected under 35 U.S.C. § 101 as allegedly being directed to non-statutory subject matter. Specifically, the Examiner alleges that claims 13 and 14 recite a "software arrangement", and that software *per se* is not considered statutory subject matter, and that claims 15 and 16 recite "a computer-accessible medium", and that such recitation is not sufficient to be considered statutory subject matter. (See Office Action, p. 3, paragraphs 7 and 8).

Although Applicants disagree with such contentions, claims 13-14 (and dependent claims 25-28) have been amended herein to recite a "computer storage arrangement" to expedite the prosecution of the present application, and not for reasons relating to patentability thereof. Further, claims 15 and 16 have been amended to recite

that a computer-accessible medium is "non-transitory" in order to expedite the prosecution of the present application, and not for reasons relating to patentability thereof. Accordingly, Applicants respectfully submit that amended claims 13-16 recite statutory subject matter.

In view of the above, Applicants respectfully request withdrawal of the 35 U.S.C. § 101 rejection of claims 13-16 and 25-32.

### **III. REJECTIONS UNDER 35 U.S.C. § 103(a) SHOULD BE WITHDRAWN**

Claims 9-32 stand finally rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over "Ultimate Strength and Failure Mechanism of Resistance Spot Weld Subjected to Tensile, Shear, or Combined Tensile/Shear Loads" Journal of Engineering Materials and Technology, April 2003, Vol. 125 pp. 125-132 by Chao (hereinafter "Chao"), in view of "Large Cold Plastic Deformation of Metal Matrix Composites Reinforced by SiC Particles" Journal of Materials Science Letters 12 (1993), pp. 1519-1521 by Jiang (hereinafter "Jiang").

Applicants respectfully assert that the combination of Chao and Jiang fail to render the subject matter recited in independent claims 9-16, and the claims which depend therefrom, anticipated or obvious.

"To reject claims in an application under Section 103, an examiner must show an un rebutted *prima facie* case of obviousness." *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1455 (Fed. Cir. 1998). The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated:

Under Section 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at

issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

Indeed, to sustain a rejection under 35 U.S.C. § 103(a), there must be some teaching, other than the instant application, to alter the prior art to arrive at the claimed invention. "The problem confronted by the inventor must be considered in determining whether it would have been obvious to combine the references in order to solve the problem." *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 679 (Fed. Cir. 1998).

The objective standard for determining obviousness under 35 U.S.C. § 103, as set forth in *Graham v. John Deere, Co.*, 383 U.S. 1 (1966), requires a factual determination to ascertain: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; and (3) the differences between the claimed subject matter and the prior art. Based on these factual inquiries, it must then be determined, as a matter of law, whether or not the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the alleged invention was made. *Graham*, 383 U.S. at 17. Courts have held that there must be some suggestion, motivation or teaching of the desirability of making the combination claimed by the applicant (the "TSM test"). See *In re Beattie*, 974 F.2d 1309, 1311-12 (Fed. Cir. 1992). This suggestion or motivation may be derived from the prior art itself, including references or disclosures that are known to be of special interest or importance in the field, or from the nature of the problem to be solved. *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996).

Although the Supreme Court criticized the Federal Circuit's application of the TSM test, see *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, (2007) the

Court also indicated that the TSM test is not inconsistent with the *Graham* analysis recited in the *Graham v. John Deere* decision. *Id.*; see *In re Translogic Technology, Inc.*, No. 2006-1192, 2007 U.S. App. LEXIS 23969, \*21 (October 12, 2007). Further, the Court underscored that “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *KSR*, 127 S. Ct. at 1741. Under the precedent established in *KSR*, however, the presence or absence of a teaching, suggestion, or motivation to make the claimed invention is merely one factor that may be weighed during the obviousness determination. *Id.* Accordingly, the TSM test should be applied from the perspective of a person of ordinary skill in the art and not the patentee, but that person is creative and not an automaton, constrained by a rigid framework. *Id.* at 1742. However, “the reference[s] must be viewed without the benefit of hindsight afforded to the disclosure.” *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994).

The prior art cited in an obviousness determination should create a reasonable expectation, but not an absolute prediction, of success in producing the claimed invention. *In re O’Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988). Both the suggestion and the expectation of success must be in the prior art, not in applicant’s disclosure. *Amgen, Inc. v. Chugai Pharmaceutical Co., Ltd.*, 927 F.2d 1200, 1207 (Fed. Cir. 1991) (citing *In re Dow Chem. Co.*, 837 F.2d 469, 473 (Fed. Cir. 1988)). Further, the implicit and inherent teachings of a prior art reference may be considered under a Section 103 analysis. See *In re Napier*, 55 F.3d 610, 613 (Fed. Cir. 1995).

Secondary considerations such as commercial success, long-felt but unsolved needs, failure of others, and unexpected results, if present, can also be considered.

*Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538-39 (Fed. Cir. 1983). Although these factors can be considered, they do not control the obviousness conclusion. *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 768 (Fed. Cir. 1988).

To establish obviousness, the prior art references must be evaluated as a whole for what they fairly teach and neither the references' general nor specific teachings may be ignored. *Application of Lundsford*, 357 F.2d. 385, 389-90 (CCPA 1966). A reference must be considered for all that it teaches, not just what purportedly points toward the invention but also that which teaches away from the invention. *Ashland Oil, Inc. v. Delta Resins & Refractories*, 776 F.2d. 281, 296 (Fed. Cir. 1985).

Independent claims 9, 11, 13 and 15 each recites that the fracture prediction formula is based on a shear force and a vertical force with respect to the spot welded portion. Independent claims 10, 12, 14 and 16 each recites that the fracture limit line is based on a shear force and a vertical force with respect to the spot welded portion.

In the Final Office Action, the Examiner alleges that Chao teaches or suggests various recitations of independent claims 9-16, but acknowledges that Chao does not teach or suggest a fracture limit line. However, the Examiner contends that Jiang cures such deficiency of Chao to teach or suggest a fracture limit line. (See Final Office Action, p. 6, paragraphs 14-16). In particular, the Examiner alleges that Chao teaches use with a spot welded portion at page 131, Section 8 thereof. In this section, however, Chao describes a spot weld subjected to normal force and shear force. Nonetheless, Chao does not describe a fracture prediction formula or fracture limit line that is based on the normal and shear forces with respect to the spot welded portion, as recited in independent claims 9-16.

As indicated herein above, the Examiner admits Chao does not teach a fracture prediction formula or fracture limit line, but alleges that Jiang teaches or suggests that the fracture prediction formula or fracture limit line can be based on a shear force and a vertical force with respect to the spot welded portion. The Examiner further contends (in para. 14 of the Final Office Action) that Jiang teaches or suggests a fracture limit line, but does not state why one of ordinary skill in the art would combine the two references so that the fracture limit line of Jiang would be based on the shear force and vertical force with respect to the spot welded portion of Chao. Indeed, one of ordinary skill in the art would not combine the references of Chao and Jiang to provide a fracture prediction formula or fracture limit line that is based on the normal and shear forces with respect to the spot welded portion, as recited in independent claims 9-16, as there is no discussion of a fracture prediction formula or fracture limit line in Chao whatsoever. Accordingly, one of ordinary skill in the art would not obtain such formula or limit line from Jiang, and then base such formula or line on the normal and shear forces with respect to the spot welded portion.

The disclosure of the present application provides exemplary embodiments where strength data obtained by test results are organized with dimensionless expression, such as the relation of the stress concentration factor " $\alpha$ " = (tensile strength "TS") / (mean tensile stress " $\sigma_0$ ") and a fraction " $d/W$ " of the nugget diameter " $d$ " and the width " $W$ ". In fracture prediction calculation, even without any actual tests, a stress concentration factor for arbitrary spot welding can be determined based on shape data by using this relation as a dimensionless expression, thereby the value of tensile strength of a steel plate to be a fracture limit can be obtained. Specifically, this can

provide an extension of the scope of prediction for a fracture limit with respect to test models or test conditions having no actual data.

Therefore, the fracture limit line recited in the claims of the present application can be used for, e.g., a calculation for infinite combinations of parameters including one in untested scope (e.g., with an applicable range).

As the Examiner admits, again, Chao fails to disclose a fracture prediction formula or a fracture limit line. In Chao, test results are organized with a formula. However, referring to Fig. 17 thereof, variation of fracture load based on plate width or variation of fracture load at the same in plate width is unformulated. Therefore, in Chao, fracture prediction for arbitrary spot welding cannot be made unless the database is infinitely expanded for each of various test models and load models.

For a simple model of a spot welded portion, it is natural that similar parameters are used in the present disclosure and in Chao. However, based on these parameters, the present disclosure describes an exemplary method of fracture prediction under various welding conditions such as in general weld constructions, by making the best use of limited test data with a stress concentration factor. In this regard, the recitations of the claims as currently pending are not taught or suggested by Chao, individually or in combination with Jiang, since Chao merely gathers methods of organizing test data.

In Jiang, since a stress-strain characteristic is decided with materials, the fracture limit line may be possible to be created depending on strain or stress. However, fracture prediction in Jiang is made using a numerical analysis. When trying to directly calculate local strain (deformation) such as spot welding fracture, it would require a very fine mesh division model, because coarse mesh division would average strain, which

results in reducing accuracy. Particularly in full vehicle collision analysis, it is not practical in view of calculating time and costs. Therefore, one of ordinary skill in the art would not combine the fracture limit line of Jiang with the disclosure of Chao.

Similarly regarding local stress in Jiang, an accuracy problem occurs by mesh division. Since stress can be converted into load by multiplying by a cross section of the member (e.g., the force balance issue), an accuracy problem by mesh division can be mitigated to some degree. Meanwhile, in actual collision analysis, a spot welded portion is simply expressed as an element in rectangular form, and load values such as vertical force and shear force applied on the spot welded portion are used for calculation, which is a general approach. For these further reasons, one of ordinary skill in the art would not combine the fracture limit line of Jiang with the disclosure of Chao.

Thus, it is clear that the alleged combination of Chao and Jiang does not teach or suggest the recited subject matter of amended independent claims 9-16, and the claims that depend therefrom.

Therefore, for at least the reasons as presented herein above, Applicants respectfully request withdrawal of the 35 U.S.C. § 103(a) rejection of claims 9-32 as being allegedly unpatentable over Chao in view of Jiang.

#### **IV. NEW CLAIMS 33-40**

New claims 33-40 have been added. Support for the new claims can be found in the originally-filed specification and drawings (e.g., paragraphs [0032], [0048] and [0050] of the printed publication of the specification of the present application). It is



respectfully requested that a confirmation of patentability of these claims be provided in the next communication for this application to Applicants' representatives.

New claims 33-36 depend from one of amended independent claims 9, 11, 13 and 15, and are thus believed to be patentable at least for all the reasons as set forth above with regard to amended independent claims 9, 11, 13 and 15. New claims 37-40 depend from one of amended independent claims 10, 12, 14 and 16, and are thus believed to be patentable at least for all the reasons as set forth above with regard to amended independent claims 10, 12, 14 and 16.

Further, new claims 33-36 recite that the fracture strength parameter is determined based on a stress concentration factor  $\alpha$  defined by (tensile strength TS) / (mean tensile stress  $\sigma_0$ ). New claims 37-40 recite that the fracture strength curve provides a graphic representation written by measuring the fracture strength parameter by a test in which at least one of the material strength, the plate thickness, the nugget diameter of the spot welding, the plate width of the joint, or the rotation angle of the particular joint in the tension testing procedure are varied. Such subject matter is not taught or suggested by Chao and/or Jiang, either taken alone or in combination.

V. **CONCLUSION**

In light of the foregoing, Applicants respectfully submit that claims 9-40 are in condition for allowance. Prompt consideration, reconsideration and allowance of the present application are therefore earnestly solicited. If any issues remain outstanding, the Examiner is invited to contact the undersigned via the telephone number provided below.

Respectfully submitted,

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